G. F. W.

Fourth Annual Meeting of - -
The South African Association
for the Advancement of Science.

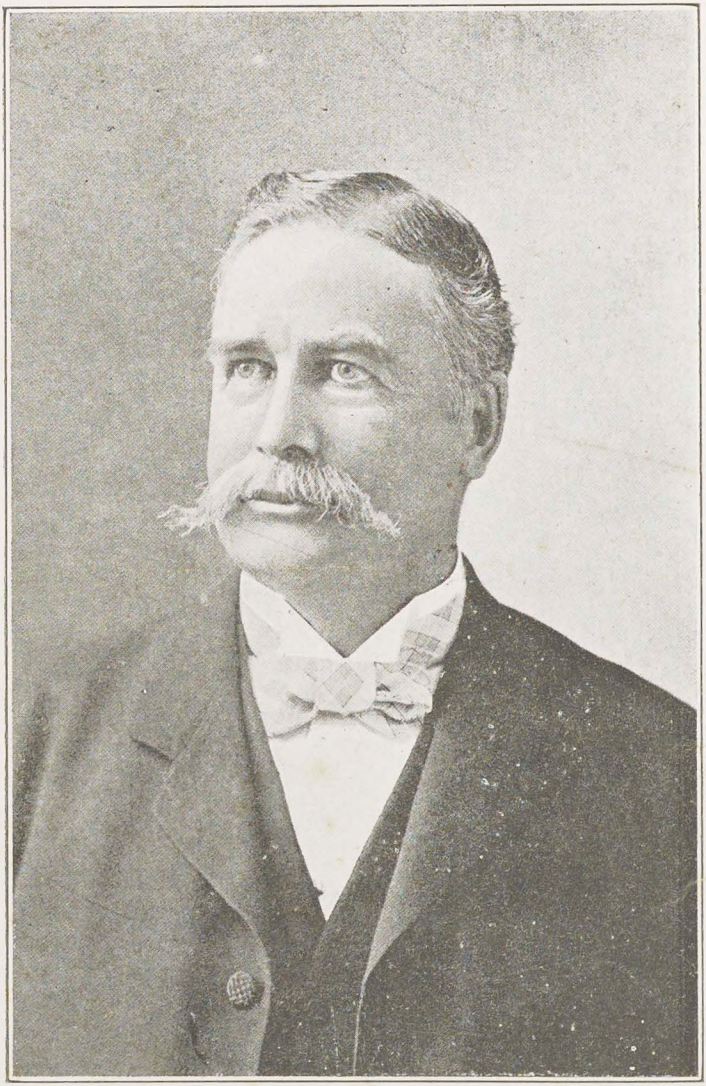
Official Programme.

Kimberley,

July 9th to 14th, 1906.

Reception Rooms - - The High Schools.

D.F.A., LTD., PRINTERS.



GARDNER F. WILLIAMS, ESQ.,
President.

THE SOUTH AFRICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

THE Headquarters of the Association will be in the High Schools, kindly lent for the occasion by the Kimberley School Board.

Tickets for the meetings will be issued to visitors on application at the Information Bureau in the High School. These tickets (which are purely personal and do not admit any friends or guests) will admit members to all the Sectional Meetings, Excursions, Public Lectures, etc., except where special tickets are required. (See "Detailed Arrangements," page 6.)

This Bureau will be open from 9 a.m. to 5 p.m. on Monday, July 9th and following days.

Visiting Members are requested to register their Kimberley addresses at the Information Bureau.

GENERAL COMMITTEE.

Chairman:

ALPHEUS F. WILLIAMS, ESQ., B.S.
(General Manager De Beers Consolidated Mines).

Hon. Secretary:

Prof. W. M. WALLACE
(The School of Mines, Kimberley).

Captain T. G. Tyson.
William Sagar, J.P.
J. J. Christie.
Dr. Arnold H. Watkins.
Major F. S. Lynch.
D. J. Haarhoff, M.L.A.
J. D. Tyson, J.P.
Capt. F. Quentrall, F.G.S.
G. A. L. Green, M.A.
F. Reunert.
W. Newdigate.
E. W. Mowbray.
Dr. J. E. Mackenzie.
C. E. Addams.
W. Gasson, F.C.S.
Dr. A. W. Reid.
J. R. Sutton, M.A.
B. L. Dyer.
W. H. Helmore.
L. A. Cary.
R. C. Ross.
H. Simpson.
D. W. Greatbatch.
E. C. Lardner-Burke.
J. H. Parry.
I. R. Grimmer.
Col. D. Harris, C.M.G., M.L.A.
John A. Neville.
A. H. J. Bourne.
Arthur H. Garcia.
Francis Oat, M.L.A.
Col. H. T. Tamplin.
W. Pickering, D.S.O.

RECEPTION AND ENTERTAINMENT COMMITTEE.

Chairman:

W. Sagar, Esq., J.P., Mayor of Kimberley.

G. A. L. Green, M.A.
L. A. Cary.
F. Reunert.
W. Gasson, F.C.S.
E. W. Mowbray.
B. L. Dyer.
Major F. S. Lynch
H. Simpson.
W. Newdigate.
Dr. J. E. Mackenzie.
D. W. Greatbatch, M.S.A.
R. C. Ross.

Hon. Secretary:

Prof. W. M. Wallace, A.R.C.S., A.M.I.C.E.
(The School of Mines, Kimberley.)

HOSPITALITY AND EXCURSION COMMITTEE.

Chairman:

Alpheus F. Williams, Esq.

D. J. Harrhoff, M.L.A.
C. E. Addams.
Capt. Tyson.
Capt. Quentrall.
Francis Oats, M.L.A.
E. C. L. Burke.
W. H. Helmore.
A. H. J. Bourne.
Dr. Arnold H. Watkins.
J. J. Christie, C.C.
J. R. Sutton, M.A.
Col. D. Harris, C.M.G. M.L.A.
Dr. A. W. Reid.
Jno. A. Neville.
J. Parry.
I. R. Grimmer.

Hon. Secretary:

Mr. H. Simpson

DETAILED PROGRAMME.

Monday, July 9, 3 p.m.—The Council will meet in the High Schools.

8.30 p.m.—The Presidential Address will be read by Mr. Wm. Newdigate in the Town Hall. Light refreshment will be provided.

Tuesday, 10 a.m.—Meetings of Sections in the High Schools.

2.30 p.m.—Members are requested to assemble at the Rock Shaft, De Beers, where special trolleys will be provided for conveyance over the Mines.

8.30 p.m.—Lecture by Prof. Lehfeldt, D.Sc., B.A., on the "Electrical Aspect of Chemistry."

Wednesday, 10 a.m.—Meetings of Sections in the High Schools.

2.30 p.m.—Meetings of Sections in the High Schools.

8.30 p.m.—Reception by the Mayor and Town Council in the Town Hall, followed by a Dance.

Thursday, 10 a.m.—Visitors are requested to assemble at the Rock Shaft, De Beers, from whence they will be conveyed to Wesselton Mine to view a blast, and Kenilworth Village.

1.30 p.m.—Luncheon will be served at the Kenilworth Club by the De Beers Company.

8.30 p.m.—Lecture by Dr. W. C. C. Pakes, on the "Immunization against disease of Micro-organic Origin" (illustrated by upwards of 50 views).

Friday, 10 a.m.—Meetings of Sections in the High Schools.

2.30 p.m.—Meeting of Council in the High Schools.

3.15 p.m.—Joint Meeting of Sections in the High Schools.

8.30 p.m.—General Meeting of Members in the Town Hall.

Saturday, 10 a.m.—Meeting of Sections (if necessary).

SECTIONAL OFFICERS:

A.—Astronomy, Chemistry, Mathematics, Meteorology, and Physics.

President:

J. R. Sutton, M.A.

Vice-Presidents:

Col. Harris, C.M.G., M.L.A.; Arthur Garcia; Hon. W. Ross, M.L.C.; Prof. P. D. Hahn, Ph.D.; S. S. Hough, M.A., F.R.S.; Col. H. R. Rawson; R. F. Rindell, B.A., F.R.A.S.; James Moir, M.A., D.Sc.; Prof. J. Morrison; Hon. Wm. Ross, M.L.C.; C. M. Stewart, B.Sc.; F. R. Williams, M.I.C.E.; Prof. L. Crawford, M.A., D.Sc.; Prof. J. C. Beattie, D.Sc; R. T. A. Innes; James Lyle; E. Nevill; Dr. H. G. Breyer.

Secretaries:

W. Gasson, F.C.S.; and A. H. J. Bourne, M.A.

B.—Anthropology, Ethnology, Bacteriology, Botany, Geography, Geology, Mineralogy and Zoology.

President:

Capt. Quentrall, F.G.S.

Vice-Presidents:

Francis Oates, M.L.A., F.G.S.; D. J. Haarhoff, M.L.A.; J. J. Christie, C.C.; R. Marloth, M.A.; J. D. F. Gilchrist, D.Sc.; R. Broom, M.D., B.Sc.; J. Burtt-Davy, F.L.S.; Dr. G. S. Corstorphine, B.Sc.; Frank Flowers, F.R.G.S.; Dr. J. W. D. Gunning; Dr. James Hyslop; Dr. H. Lyster Jameson; Sir Godfrey Lagden; C. P. Loundsbury; Prof. H. H. W. Pearson; George Potts, B.Sc.; A. W. Rogers, M.A.; S. Schonland, M.A., Ph.D.; J. Stuart Thomson; A. Van Desauer; Prof. A. Young, M.A.

Secretaries:

C. E. Addams and H. Simpson.

Sir Walter Hely-Hutchinson,
Governor of Cape Colony.

C.—Agriculture, Architecture, Engineering, Geology, Surveying and Sanitary Science.

President:

SYDNEY H. JENNINGS.

Vice-Presidents:

Capt. Tyson: Alpheus F. Williams; Major F. S. Lynch; Col. Tamplin; Sir Charles Metcalfe; R. H. Hammersley-Heenan, M.I.C.E.; Prof. Henry Payne, A.M.I.C.E.; A. Jasper Anderson, M.A.; H. A. Bailey; W. Bradford; G. A. Denny; E. Farrar; D. E. Hutchins; James G. Lawn, A.R.S.M.; E. H. V. Melvill; C. W. Methven; Eric A. Nobbs; Prof. J. Orr; Arthur H. Reid; T. R. Sim; F. B. Smith; A. Struber; W. K. Tucker, C.M.G.; John Waterson; Franklin White; E. Williams.

Secretaries:

D. W. GREATBATCH, M.S.A.; and WILLIAM NEWDIGATE, Government Surveyor.

SECTION D.

President:

DR. ARNOLD H. WATKINS.

Vice-Presidents:

Dr. Thomas Muir, C.M.G., F.R.S.; Sir Percy Fitzpatrick; Howard Pim; Prof. H. E. S. Fremantle; Prof. Thomas Walker, M.A., LL.D.; William Sagar; F. R. Whitton, M.A.; I. R. Grimmer; R. A. Ababrelton; A. J. Beston; Hon. Sir William Bisset Berry, Kt., M.A.; S. E. Court; S. Evans; Rev. W. Flint, D.D.; W. Pickering, D.S.O.; J. M. P. Muirhead; T. R. Price; Theo. Reunert; J. Robinson; E. B. Sargent, M.A.; W. F. Wybergh.

Secretaries:

E. C. LARDNER-BURKE and E. W. MOWBRAY.

OBJECTS OF THE ASSOCIATION.

The objects of the Association are :—To give a stronger impulse and a more systematic direction to scientific enquiry ; to promote the intercourse of Societies and individuals interested in Science in different parts of South Africa ; to obtain a more general attention to the objects of pure and applied Science, and the removal of any disadvantages of a public kind which may impede its progress.

Membership.

All persons interested in the objects of the Association are eligible for membership.

Privileges of Members and Associates.

Members are eligible for all offices of the Association and to serve on its Committee, and shall be entitled to a copy of all ordinary publications issued by the Association subsequent to the date of their election.

Associates are eligible to serve on the Local Reception Committee, but are not entitled to receive gratuitously the publications of the Association.

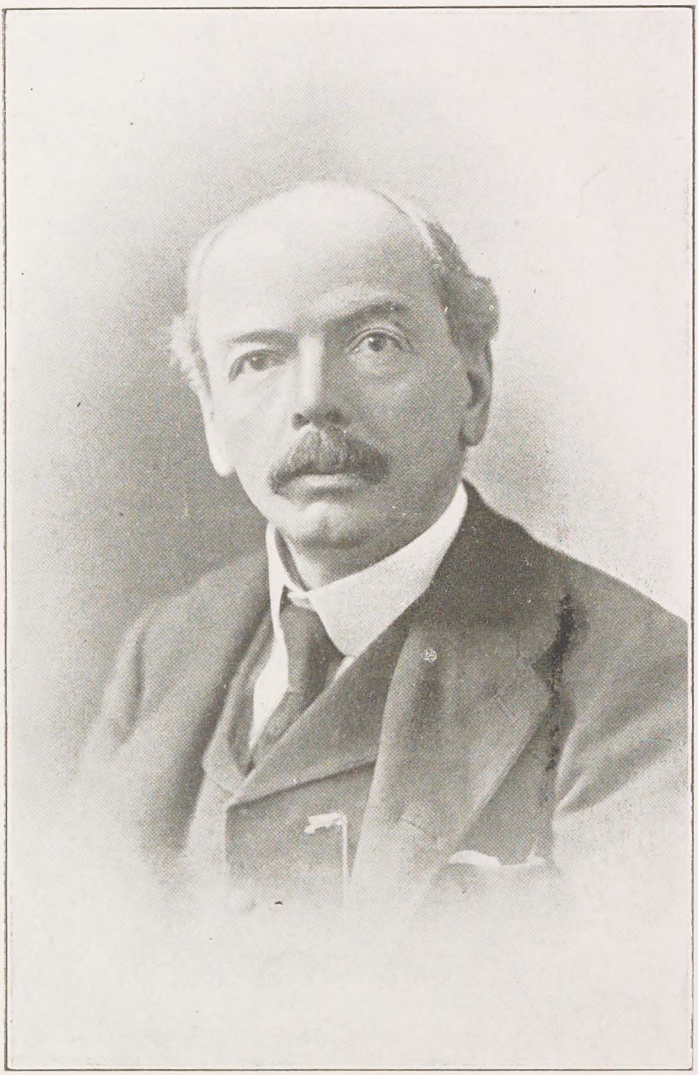
Subscriptions.

The Annual Subscription for Members is One Pound, payable first at election, and thereafter on the First of July of each year. In addition, an Entrance Fee of One Pound must be paid.

A Member may at any time become a Life Member by one payment of Ten Pounds, in lieu of future Annual Subscriptions, or in lieu of Entrance Fee and future Annual Subscriptions.

The Annual Subscription for Associates is Fifteen Shillings.

The Council may authorise Local Committees to admit students as Associates at a reduced subscription on the special circumstances of each case being submitted.



Dr. L. S. Jameson,
Prime Minister.

The following are some of the Papers that will be read at the Meeting :—

SECTION A.

PRESIDENTIAL ADDRESS :
J. R. SUTTON, M.A.

1. Anticyclones and their Influence on South African Weather.—Col. H. E. Rawson.
2. The Barometer in South Africa.—R. T. A. Innes.
3. Recent Cometary Observations—R. F. Rendell.
4. Some Meteorological Conditions in Bulawayo—Rev. E. Goetz.
5. Temperature Variability in South Africa—J. R. Sutton, M.A.
6. On Predicting Times of High Water at Durban, Natal—R. F. Rendell.
7. The Manurial Needs and Resources of the Transvaal—Herbert Ingle.
8. On the Observation of Earthquakes and other Earth Movements—Prof. John Milne, F.R.S.
9. New Monthly Cloudiness Chart of the United States—Kenneth S. Johnson.
10. A New Solvent for Gold—Dr. James Moir, D.Sc.
11. A Paper by Prof. J. C. Beattie will be read by Dr. Crawford.
12. A Paper by H. G. Breyer will be read by Dr. Lehfeldt.

SECTION B.

PRESIDENTIAL ADDRESS:

CAPT. THOS. QUENTRAL, F.G.S., M.I.MECH.E.

1. Mud Rushes—E. H. L. SCHWARZ.
2. The Seven Rayed Holed Stone in South Africa and America—E. H. L. SCHWARZ.
3. The Distribution and Variation of the Tortoises of South Africa—J. E. DUERDON.
4. Death Feigning in Ostriches—J. E. DUERDON.
5. Geography as a Factor in Higher Education—FRANK FLOWERS.
6. Features in the Vegetation in South Africa due to Prevailing Winds—DR. R. MARLOTH.
7. The Negro in America—LANE CARTER.
8. Bushman Art—W. A. SQUIRE.
9. Geographical Distribution of Native Trees of the Transvaal—J. BURTT-DAVY.
10. Witchcraft and its Customs—REV. JUNOD.
11. "Modjadje": a Native Queen in Northern Transvaal—REV. REUTER.
12. Sunrise Moisture and Growth—COL. H. E. RAWSON.
13. Some South African Cycads: their Habitats, Habits and Associates—PROF. H. H. W. PEARSON.
14. The Glacial Beds in the Griquatown Series—A. W. ROGERS.
15. Life Histories of Some of our Insect Pests—C. W. HOWARD.
16. Concentrates—PROF. HUTCHINSON.
17. Geology of Diamond Pipes—PROF. MIERS.
18. The "Black Spot" Disease on Apples and Pears—J. B. POLE EVANS.

19. The "Black Rust" of Wheat, etc.—J. B. Pole Evans.
20. Infectious Experiments with Uredo Graminis, Pers.—J. B. Pole Evans.
21. Immunity in Certain Wheats to Rust—J. B. Pole Evans.

SECTION C.

PRESIDENTIAL ADDRESS:

SIDNEY J. JENNINGS, C.E., M.Am.I.M.E., M.I.M.M.

1. The Realm of Alfalfa—S. Hodder.
2. Locust Birds of the Transvaal—F. Thomson.
3. Important Insect Pests of the Year—C. W. Howard.
4. Locust Destruction in the Transvaal—C. B. Simpson.
5. Mosquitoes and Malaria in the Transvaal—C. B. Simpson.
6. South African Horticulture—T. R. Sim.
7. Smoke Abatement in Mining Centres—Arthur H. Reid.
8. Sanitary Science—Arthur H. Reid.
9. Irrigitation and Inter-Colonial Co-Operation—W. L. Strange.
10. Coal Testing—Prof. W. M. Wallace.
11. The Arnold-Bragstad-La Cour Polycyclic System of Current Distribution—Prof. H. Bohle.
12. Further experience in the Bacterial Treatment of Sewage—J. C. S. Beynon.
13. Theoretical Investigations regarding Ferro-Concrete—H. Kestner.
14. An Underground Traverse—A. E. Payne.
15. Water Rating—G. W. Herdman.

16. Irrigation in Egypt and in South Africa—F. A. Hurley.
17. Sanitary Science—J. S. Dunn.
18. On the Construction of School Buildings—G. Bernfield.
19. Farm Irrigation in the Transvaal—C. D. H. Braine.

SECTION D.

PRESIDENTIAL ADDRESS:

ARNOLD H. WATKINS, M.D., M.R.C.S.

1. Native Education in its Higher Branches—K. A. Hobart Houghton.
2. Some Population Figures—J. M. P. Muirhead.
3. Archæology in South Africa—Prof. R. J. Cholmely.
4. Botany as a School Subject—Dr. S. Schonland.
5. Climatic Influence upon Character—J. Abercromby Alexander.
6. Place of Manual Training in South African Education—Thomas Lowden.
7. Libraries for Scattered Districts—Bertram L. Dyer.
8. A Paper on "Sociology"—Mrs. Wybergh.
9. A Paper on "Mental Science"—W. Wybergh.
10. Museums in South Africa and a General Museum for the whole of the Sub-Continent—Dr. J. W. B. Gunning.
11. Agricultural Land Banks and Agricultural Co-operation in Relation to the Requirements of the Transvaal and of South Africa Generally—Barker.
12. Paper by S. E. Court.

The Official Journal of Sectional Proceedings, &c.

The Official Journal can be obtained daily at 2 o'clock at the tables in the Reception Rooms, and will contain announcements for the day following.

The Journal of Proceedings for Tuesday the 10th of July, however, will be handed to Members on the previous evening at the conclusion of the General Meeting.

Reception Rooms.

The Reception Rooms at the High Schools will be open on Monday, the 9th July, and on the following days, from 9 a.m. to 5 p.m.

The following offices, etc., will be in the Reception Rooms :—

1. General Secretary's Office.
2. Tickets for Entertainments, Excursions, &c.
3. Hotels and Lodgings, and other information for strangers on arrival.
4. Writing Room.
5. Smoke Room.
6. Ladies' Room.
7. Press Room.

Sectional Meeting Rooms.

The meetings of the various sections will be held in the class-rooms of the High Schools ; a plan showing the rooms of the different sections will be on view in the large Reception Hall.

The Sectional Committee Rooms will be in the vicinity of the Meeting Rooms, and will also be shown on the above-mentioned plan.

THE METEOROLOGICAL OBSERVATORY AT KENILWORTH.

Meteorological observations were commenced at Kenilworth about 1890 with a marine barometer, maximum and minimum thermometers, and wet and dry bulb hygrometers, and a rain gauge—all unverified at Kew—and, with the exception of the rain gauge, not of the best construction. These instruments were, however, soon replaced by better ones, and additions were made from time to time, so that at present the equipment is something more than that of a good station of the first order.

The principal instruments are :—

A fine Standard Barometer, with a fixed cistern and adjustable zero point.

A small Fortin Barometer, with an adjustable cistern and fixed zero point.

A large Photo-Barograph, by means of which the height of the mercurial column of a good barometer is photographed continuously upon a sheet of bromide paper wrapped round a drum driven by clockwork.

A double set, of twelve each, of Negretti and Zambra's patent Reversing Thermometers for registering the hourly temperatures of the wet and dry bulbs. These thermometers, originally invented for the purpose of determining the temperature of the sea at any given depth, have been adapted with considerable success to meteorological purposes ; but Kenilworth is probably the only station at which they have been used for obtaining hourly

simultaneous registrations of the temperature of the air and of evaporation. They are mounted in a large louvred screen (8 × 8 × 8 ft.), and are reversed hourly in pairs through the agency of clockwork and electricity. They register the required temperatures at the instant of reversing.

An Osler Anemometer for recording continuously the direction of the wind and its strength in gusts.

A Robinson Anemometer for recording continuously the velocity of the wind.

An Auxanometer for recording continuously the evaporation from, and the rainfall into, a large circular steel tank. As the water in the steel tank falls or rises a copper float in an adjoining vessel falls or rises, and by means of a lever writes a magnified record of its movements upon a rotating drum.

A Rain Gauge recording the hourly rainfall by means of clockwork and electricity.

A Jordan Photographic Sunshine Recorder, by means of which the passage of every cloud over the sun is permanently recorded.

A 4½ inch Equatorial Telescope, fitted with Wedge Photometer and Spectroscope.

A large Horizontal Pendulum Seismograph, recording variations of level upon smoked paper ; a Milne Bracket Seismograph ; a Duplex Pendulum Seismograph ; some Tromometers and Vertical Pendulum Level Testers.

There are, in addition to the above, the usual thermometers for obtaining the maximum and minimum temperatures of the air, of the ground, and of solar and terrestial radiation, besides various Evaporation Gauges, Electrometers, and other instruments for experimental work.

The various clocks are kept to time chiefly by means of an Oliver Mean Time Sundial, whose indications are reduced to the meridian of $22\frac{1}{2}°$ E. The approximate position of the Observatory is—

24° 27′ E.
28° 42′ S.
Altitude, about 3,950 feet.

The site is not a good one, and many important researches, such, *e.g.*, as the study of atmospheric electricity, cannot be carried out. A better site (and one worthy of the exceptional geographical advantages of Kimberley) would have been provided in 1894, when the De Beers Company offered to contribute one-half the cost and upkeep of a Government Observatory to be built in the vicinity of Kimberley, and the Government of that day favoured the idea, but the Meteorological Commission "could not see the good of it," and the scheme therefore fell through.

The following are annual averages of some of the most important climatic elements at Kenilworth :—

Max. Temp. in the Sun	...	137·8 degrees.
,, ,, in the Shade	...	79·2 ,,
Min. ,, in the Shade	...	49·9 ,,
,, ,, over Grass	...	45·6 ,,
Barometric Pressure	...	26·132 inches.
Wind Velocity ...	...	5·8 miles per hour.
Rainfall	...	18·24 inches.
Dew Point	...	43·2 degrees.
Humidity	...	53 per cent.
Duration of Sunshine	...	78 ,, ,,
Percentage of Cloud ...	...	28 ,, ,,

DIAMOND MINING IN KIMBERLEY.

The blue ground from which the diamonds are extracted occurs in vertical pipes, which are roughly elliptical in horizontal section.

Formerly, as will be observed from the number of deep holes in and around Kimberley, this was extracted by open mining until the method become too dangerous on account of subsidences, and various methods of underground mining were tried.

The method now in use was originated by Mr. Gardner Williams soon after the various mines were consolidated, and may be described briefly thus :—

A vertical shaft is sunk near the open mine in the rock from which a tunnel is cut across the major axis of the pipe in a horizontal direction, and from this again tunnels are driven at right angles until the face of the rock is reached.

At the rock face the sides and roof are blasted until the various tunnels are connected by a gallery running along the rock. The roof of this gallery is then stoped back, the miners standing on the blue ground, which has fallen, in order to effect this.

In this manner the blue ground is mined out and the superincumbent reef, which presented such difficulties in the earlier methods of mining, is allowed to fall naturally and fill up the space.

Numerous systems of tunnels and galleries, as described above, are formed spaces at distances of forty feet vertically and operated at the same time, care, of course, being taken that the miners at one level do not cut the ground from under the feet of those working in the levels above.

The blue ground as mined in this way is fairly hard (specific gravity, 2·6—2·8), and required to be laid out on the floors exposed to the weather for a period depending on its degree of hardness until, under the influence of wind and rain, it is sufficiently softened to permit of its being washed in the washing machines.

The operations in the mill are simply those of crushing the harder blue ground, titrating and grinding with water and washing away the light earthy impurities.

The heavy concentrates are then taken to the pulsator where they are separated into different grades according to size, and afterwards passed over the greasers, which are slightly inclined tables given a rocking motion by cams underneath and covered with a layer of grease to which the diamonds adhere, the other materials passing over the tables with the water.

The precious stones are recovered from the grease by boiling with water.

HOTEL TARIFFS.

Sanatorium	...	£1 per diem.
Savoy Hotel		12/6 to 15/- per diem.
Grand Hotel	...	10/- per diem.
Queen's Hotel	...	12/6 per diem.
Central Hotel	...	12/6 per diem.
Grosvenor House Private Hotel (Dutoitspan Road)	...	7/6 per diem.

Special Arrangement for Inspecting Underground Mining in De Beers Mine.

Visitors wishing to go down into the De Beers Mine can obtain a special permit from Prof. Wallace, as a limited number can be permitted each afternoon at 3 p.m. prompt.